Filed 8/9/21; see concurring and dissenting opinion

CERTIFIED FOR PUBLICATION

IN THE COURT OF APPEAL OF THE STATE OF CALIFORNIA

FIRST APPELLATE DISTRICT

DIVISION TWO

ALBERTA PILLIOD et al., Plaintiffs and Appellants, v. MONSANTO COMPANY, Defendant and Appellant.	A158228 (Alameda County Super. Ct. No. RG17862702)

After years of spraying Roundup herbicide on their property, Alberta Pilliod and her husband, Alva Pilliod, each developed non-Hodgkin's lymphoma. The Pilliods sued Monsanto Company, the manufacturer of Roundup, for damages based on claims of design defect and failure to warn. After a six-week trial, the jury found for the Pilliods, awarded Alberta over $37 million in compensatory damages, awarded Alva over $18 million in compensatory damages, and awarded each of them $1 billion in punitive damages. The trial court conditionally denied Monsanto's motion for new trial, contingent on the Pilliods' acceptance of substantially reduced compensatory and punitive damages, resulting in a total award to Alberta of about $56 million (including about $45 million in punitive damages) and a total award to Alva of about $31 million (including about $25 million in punitive damages). The Pilliods accepted the reductions.

On appeal, Monsanto argues that the Pilliods' claims are preempted by federal law, the jury's liability findings are not supported by substantial

evidence, the jury was improperly instructed as to the Pilliods' design defect claim, the jury's causation findings are legally and factually flawed, the trial court abused its discretion by admitting certain evidence, and the verdict is the product of attorney misconduct. Monsanto also argues that the punitive damages awards should be stricken or further reduced because they are unsupported by evidence and constitutionally excessive. In their cross-appeal, the Pilliods argue that the trial court erred in reducing the jury's awards for compensatory and punitive damages. We shall affirm.

FACTUAL AND PROCEDURAL BACKGROUND

We summarize the facts and evidence in the light most favorable to the judgment. (*Cassim v. Allstate Ins.* (2004) 33 Cal.4th 780, 787 (*Cassim*).)

A. *Roundup Herbicide*

Monsanto manufactures Roundup products, which contain glyphosate, an herbicide that kills grasses and broadleaf plants. Glyphosate, the most commonly used herbicide around the world, acts systemically: it is absorbed by the plant, travels to the root, and kills the plant at the root so it will not grow back. The United States Environmental Protection Agency (EPA) evaluates the safety of herbicides and determines whether they can be sold in this country. Monsanto has had approval from EPA to sell glyphosate-based herbicides since 1974.

In order to obtain that approval, Monsanto provided EPA with the results of studies that examined the effects of glyphosate on animals, including cancer studies conducted on animals by Industrial Bio-Test Laboratories (IBT). The studies were later found to be invalid, and Monsanto eventually repeated them in accordance with EPA guidelines.[1]

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[1] Further information about IBT and Monsanto's response to the invalidity of the studies appears below in section E of the Discussion.

In 1985, an EPA panel classified glyphosate as a possible human carcinogen, based on a 1983 study in which glyphosate produced a dose-related increase in rare kidney tumors and malignant lymphomas in mice (1983 Study).

In 1991, EPA reclassified glyphosate as a substance for which there is "evidence of non-carcinogenicity for humans," on the basis of a "lack of convincing carcinogenicity evidence in adequate studies in two animal species." The reclassification notice emphasized that the designation "should not be interpreted as a definitive conclusion that the agent will not be a carcinogen under any circumstances." The 1991 reclassification remained in effect through the time of trial.

In the decades since EPA first approved the sale of glyphosate-based herbicide, glyphosate and Roundup have been extensively studied. Three types of data are widely accepted as being relevant to determine whether a substance causes cancer: human cancer data (the realm of epidemiology, which studies human populations to understand the causes of disease), experimental animal data, and mechanism data. Mechanism data includes studies of how a substance is absorbed and metabolized, as well as studies of genotoxicity and oxidative stress.[2]

In 2015, a "working group" of 17 scientists, convened by the International Agency for Research on Cancer (IARC), determined that Roundup and glyphosate are probably carcinogenic to humans, based on the group's review of published human cancer data, experimental animal data,

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[2] Genotoxicity refers to damage to a cell's DNA. Such damage can cause mutations in DNA, which can lead to cancer. Oxidative stress occurs when cells generate free oxygen radicals, which can bind to DNA, leading to genotoxicity.

and mechanism data.[3] The IARC is part of the World Health Organization. One of the Pilliods' experts characterized the IARC as "the worldwide authority on establishing whether an agent is a carcinogen." One of Monsanto's experts, whose textbook on cancer epidemiology cites the IARC hundreds of times, declined to go that far, but conceded that the IARC is "one of the important cancer agencies." The methodology used by the IARC to assess causality is widely used and accepted by scientists around the world.

Although the IARC's determination, issued in 2015, postdates the period of the Pilliods' most extensive use of Roundup (1982 through 2011), data that was cited and relied upon by the IARC was available to Monsanto as long ago as 1980.

As a result of the IARC's classification of glyphosate as a "probable human carcinogen," glyphosate is listed as a substance known to the State of California to cause cancer under Proposition 65 (Health & Saf. Code, §§ 25249.5–25249.13). Monsanto presented evidence that since the IARC announced its classification, numerous regulatory agencies around the world have concluded that glyphosate is not carcinogenic or is not likely to be carcinogenic. In particular, in September 2016, EPA's Office of Pesticide Programs reviewed and evaluated over 120 epidemiological, animal carcinogenicity, and genotoxicity studies of glyphosate and concluded that "the available data and weight-of-evidence" support the statement that

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[3] Monsanto emphasizes that the IARC conducted a "hazard assessment," which determines whether a substance has the potential to cause cancer at some dose, and not a "risk assessment," which considers whether the level of exposure to humans causes harm. The Pilliods emphasize that the IARC assessment was based on epidemiology data indicating that at real-world exposure levels, Roundup formulations cause non-Hodgkin's lymphoma.

glyphosate is " 'not likely to be carcinogenic to humans' at doses relevant to human health risk assessment."[4]

But in 2017, a Scientific Advisory Panel of independent scientists that EPA had asked to review its assessment of glyphosate issued a report concluding that EPA's 2016 evaluation failed to follow EPA's own guidelines in several ways. Further, according to the Panel's report, though "some Panel members agreed with the characterization of glyphosate as "not likely to be carcinogenic to humans," other Panel members felt that a better characterization would be "suggestive evidence of carcinogenic potential." And "many Panelists noted that crucial data were equivocal, and that additional date on cancer morbidity and/or mortality from studies of glyphosate-exposed workers would be desirable."

Glyphosate is not the only ingredient in Roundup, and testimony at the trial was not limited to glyphosate. Roundup also contains a surfactant, which enhances the absorption of the herbicide through the waxy surface of a plant.[5] The surfactant also enhances the absorption of the herbicide through skin.[6]

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[4] The office noted, however, that "due to conflicting results and various limitations identified in [epidemiological] studies investigating [non-Hodgkin's lymphoma], a conclusion regarding the association between glyphosate exposure and risk of [non-Hodgkin's lymphoma] cannot be determined based on the available data."

[5] Roundup also contains water; small amounts of formulating ingredients, such as coloring and foaming agents; and trace amounts of contaminants that are known to be carcinogenic.

[6] EPA is concerned with the cancer-causing potential of glyphosate alone, rather than glyphosate-based pesticide formulations. In this respect the approach taken by EPA differs from that taken by the IARC. EPA's Scientific Advisory Panel pointed out, however, that epidemiologic studies of

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